



Field Journal

E. A. Goldman

Biological Survey of
Arizona.

May 2 - Oct. 31, 1916

May 2, 1916

Left Washington, D.C. for Arizona.
10.45 P.M. accompanied by H.H.T. Jackson
and Walter Taylor, travelling by So. Ry.

May 3, 1

Early morning found our train
running through North Carolina. Trees
along road appearing very fresh
in early spring dress. Dogwood
(Cornus florida) apparently in full
flower.

May 4

at six A.M. train passing through
bayous and lakes east of New
Orleans. Looked in vain for
muskrat nest in grassy or sedge
areas. Reached New Orleans at 7.35 A.M.
left at 11 A.M. Cypress swamps look
very attractive in fresh foliage. Rice
corn and sugarcane recently planted
and beginning to grow rapidly.

May 5

Entire day travelling across Texas.

May 6.

Arrived at Bowie, Ariz. 4.30 A.M.
Walked out about $3\frac{1}{2}$ miles to
north base Dos Cabezas Range
about south from town and
climbed up basal slope about
200 ft. to lower limit of junipers
at about 4000 ft. altitude. Lower
limit of upper Sonoran zone on
this slope seems to be at
approximately 4500 ft. and juniper
thrust more numerous at that elevation
and probably oaks ~~signs~~. Made
a report on observations here.
Took train to San Carlos at 2.30
and reached that point at 6.45
P.M.

May 7 (Sun.).

Remained at San Carlos until
8 P.M. when we left for Rice by
rail, arriving about 8.25 P.M.
Stopped at W.C. Tiffany's place.
At San Carlos gathered considerable
information in regard to country.

May 8 (Mon.)

Spent the day at Rice
organizing outfit to have

in the morning for Nantan
Plateau. I am informed by Perry
McMurren an old timer who seems
to be well-informed that the
proper name of these mountains
is Nantan Plateau or Nantan
Mountains, the name meaning
in the Apache Indian language
captain or chief.

May 9 (Tue.).

Left Rice at 8.25 A.M. by wagon
driven by an Apache Indian.
His little team of horses was
unable to make rapid progress
and it took until about 4 o'clock
to reach Cazador Spg. near the
base of the Nantan Plateau and
at 4150 ft. altitude. A noon stop
was made to feed and rest the
team on Cazador Creek. Distance
travelled about 16 miles.

Road ascended gradually along
sloping mesas between Cottonwood
and Cazador creeks to Cazador
Spring. Some of the mesas are
capped with volcanic rock.

Cercidium Torreyanum was in full bloom along the way the trees a mass of pale yellow flowers.

Arrived at Casador Spring in time to set out a good lot of traps.

May 10 (Wed.)

Traps at Casador Spring yielded 10 species of mammals.

Left Casador Spr. and travelled about 10 mi. N.E. to the sawmill near the summit of the Nantan Plateau, and on the road to White River Indian Agency. Altitude at sawmill 5800 ft.

Road ascended an easy grade and crossed the southern rim of the plateau at about 6100 ft., descending thence to the sawmill a distance of about $2\frac{1}{2}$ miles and at about 400 ft. lower. Mr. Vaughn at the sawmill remembered my visit of last year and provided quarters for us. No yellow pines were seen until we approached the rim of

the plateau. Practically all of the pine timber is on the top.

May 11 (Thurs.). Nantan Plateau.

Remained working in vicinity of sawmill. In afternoon a trip was made for several miles down sawmill canyon as it is called, where traps were set for carnivores.

May 12 (Fri) Nantan Plateau.

Made a trip today on horseback for about five miles eastward along the crest of the plateau. The road from the sawmill to Black River follows the crest turning to the eastward for several miles and then descends into Bronco Canyon, a very rough canyon, or at least a rough road traversing it.

The general area along the crest is Transition Zone, considerable areas of yellow pine, Quercus monilicarpa and Ceanothus fendleri marking pine patches, but Upper Sonoran elements intrude in many places.

May 13 (Sat.) Nantan Plateau

Made a trip up to summit of Bear Canyon Peak about 3 mi. S. of the sawmill. This peak appears to be the highest of the range, reaching an altitude of 6700 ft. the vegetation on the top of the same character as 1000 ft. lower down, and including many Upper Sonoran species. Among the summit species are *Pachyphloea*, *Nolina*, *Agave parryi*, *Amelanchier* ^{*argentea*} ~~*argentea*~~ and a number of others growing on barren hill tops. Patches of *Quercus gambelii* and yellow pine grow on the north slope. This part of the Nantan Plateau is highest along the south rim, but the range is much scarred with interlocking canyons extending out on the northern and southern sides. It is low and rather narrow near Nantan or "Natanus Butte", but extends well to the eastward of that point, leaving an apparently ^{rather} narrow plain between it and the Gila Range. There is a strong intrusion of Upper Sonoran elements here and

there extending nearly or entirely across the range, but in places, especially on north slopes and on flats between crests there are considerable areas of nearly pure Transition zone, these areas being marked by yellow pine, Gambel oak and *Chaenothus Fendleri* which occur nearly to the exclusion of other species.

May 14 (Sun.) Nantan Plateau

Spent part of day searching for Abert's squirrel which is said to occur sparingly, but I have been unable to find any traces of its usual work on the pines. Set traps in afternoon.

May 15 (Mon.) Nantan Plateau

to Rice, Ariz.

Left sawmill on road to White River Indian Agency, top of plateau at 8 A.M. and returned to Rice - distant 25 mi.

Road ascended gradually from the sawmill about $2\frac{1}{2}$ mi. where

it crosses the crest at 6200 ft. traversed on the upward trip and then descended the long, gradual road, well graded along the steep face of the mountain to an altitude of about 5400 ft. where the slope becomes less steep and an inclined mesa extends down several miles to Casador Spr. where we stopped an hour for lunch and to feed team. Left Casador Spr. about 1 P.M. and continued down the inclined plain or mesa to Rice arriving about 6 P.M. at W.C. Tiffan's place. Six species of lizards were collected along the road.

May 16 (Tue.). Rice, Ariz.
Remained at Rice preparing specimens, collected yesterday and making report on recent work. Jackson was waiting for train to Globe, 6 hours late, when we went to bed.

May 17 (Wed.) Rice, Ariz.
Finished field report today and arranged to start field work at this locality tomorrow. Jackson got away for Globe some time during the night.

May 18 (Thurs.). Rice, Ariz.
Spent first 1/2 of day hunting birds along San Carlos Creek and obtained several species of migrants. Taylor who was hunting on the mesa brought in several species additional to mine. In the afternoon traps were set.

May 19 (Fri.). Rice, Ariz.
General collecting

May 20 - 22
General collecting and on last date preparation of report at Rice, Ariz.

May 23 (Tue)
^{about 10 a.m.} Left Rice and travelled northwesterly about 22 miles to a point near the copper mine at McMillenville, arriving

at 5 P.M. (4250 ft.).

Road from Rice ascended Sycamore Creek, or wash which seems more accurate, the ascent being scarcely noticeable for a number of miles and gradual all the way, the wash dry and bordered by low bluffs beyond which the valley slopes back very gradually toward the neighboring mountains. We stopped at Debo's at the Crossup cattle ranch where we got water and ate some lunch. Toward coming water was encountered running down the bed of the stream and from this point up to near McMillenville there was a running stream all along. Near where we encountered the water the valley narrowed and we entered low hills which increased in height as we proceeded. About five miles below McMillenville we passed the mouth of a canyon entering from the east and turned up a western branch leading to McMillenville. This point is near the upper limit of the Lower Sonoran zone. We camped among scrub oaks and sycamores along the creek in the lower edge of upper Sonoran zone and about 3 miles below

McMillenville. *Canotia* bushes appeared as a prominent growth along the west side of the wash bluffs a few miles above Rice and about 15 miles above began to appear on the eastern side instead, owing to increased altitude. *Acacia constricta* was in full bloom all along the way, and the air was filled with its fragrance.

May 24 (Wed.) Salt River ^{2750 ft.}
Left camp about 3 miles below McMillenville ^{at 8 A.M.} and travelled 16 or 18 miles by a somewhat roundabout a point on Salt River estimated to be about 12 miles north of McMillenville, arriving and making camp about 4.30 P.M.

Road led up the creek, ascending steadily to an altitude of 4600 ft. at the mining camp where we arrived at 9 P.M. Leaving the mining camp we turned eastward over the trail to the asbestos mine which is said to be 18 to 22 miles away in the hills near the western end of the Navajo Plateau. After following this trail for about an hour along a wash leading into Sycamore Creek we turned up one of the main

ones descending from the low ridge separating the Salt and Gila valleys. He soon came out on the summit of this ridge, finding it broad and rolling and connecting the Apache Mountains near McMillenville with the western end of the Navaho Plateau. From this point no ^{apparent} trail seemed to lead in our direction and following indistinct cattle ~~trails~~ ^{across} along the top we worked down through oak and other brush until we encountered the heads of canyons leading to Salt River. Bearing a little to westward we crossed several canyons, stopping in one containing water large enough for lunch, and finally descended a narrow, steep canyon to the river.

The summit was crossed at 4500 ft. Here ^{scrub} oaks and other Upper Sonoran vegetation grows on the level while, ~~Prosopis~~, Gugg acacia and a few others persist on steep south slopes. At the river which traverses a gorge at this point the altitude is 2750 ft.

We camped on a slightly sloping terrace overgrown with mesquite, palo verde,

Fouquieria etc, ~~at~~ at the foot of a steep hill and about 30 ft. above the river. Our camp under a mesquite. Hill behind camp overgrown with Grinnellia, a few Leavenworthia, Dodonaea, Fouquieria, Dasylirion and occasional junipers. Hammer exposures are dotted with Carnegiea and Echinocactus.

May 25, ^(Thurs.) Salt River, 12 mi. N. of McMillenville.

Remain at same camp. In afternoon Taylor and I made a trip for several miles up along the river. Found rather rough climbing along the front of the bluffs bordering the river and decided to come back across the top. Beyond rugged ridges reaching to the canyon just above our camp the country becomes somewhat less rugged near the stream and is about the same in character on both sides. It is rocky and there is no loose sandy land anywhere.

We set our traps in the lower part of a side canyon where a bamboo-like plant, ferns, and Mimulus

and columbine are matted on wet banks.

May 26 (Fri.), Salt River,
12 mi. N. of McMillenville.

Remained at same camp. Specimens taken in traps last night consisted of Peromyscus boylii and P. eremicus only.

Had a fine bath in Salt River in evening, but water pretty cold - water clear.

Weather rather warm today, but not really very hot.

On hot slopes near the river giant cactus, Encelia farinosa, Opuntia bigelovii, Acacia greggii, and mesquite are associated - on cooler slopes Simmondsia, Diospyros wheeleri, Ceanothus, Yucca baccata are commonly associated.

May 27 (Sat.)

Left camp on Salt River and moved about 4 miles up to a point ^{at 2800 ft.} on a small arroyo flowing down the north side of the ridge south of the river. Made camp at about 10 A.M., having left the river about 8 and set out a good lot of traps baited with

May 28 Sun

meat for carnivores. Traps contained a fox and a leopardus - the latter taken by Taylor. In the afternoon, after making up specimens we left camp about 3 P.M. and travelling across country ^{about 6 P.M.} camped on one of the headwaters of Sycamore Creek about 3 mi. N.E. of McMillenville. altitude of camp about 4500 ft. Traps were set for small mammals mainly.

May 29 (Mon.) Rice, Ariz.

Took up traps and travelled about 25 miles down Sycamore Creek to Rice - left camp about 8 A.M. and making a short stop for lunch at Crossup Ranch, reached Rice about 4 P.M.

May 30 (Tue.) Rice, Ariz.

Finished making up specimens and spent remainder of day working on reports.

May 31 (Wed.) Rice, Ariz.

Working on reports at Rice.

June 1st (Thurs.)

Finished reports and accounts for month and began preparations for further work.

June 2, (Fri.) ^(5000 ft. 30 mi.)

Left Rice in afternoon and travelled about 20 miles to Warm Springs northeast from Rice where we camped on the plateau at about 4000 ft.

Road ascended San Carlos River four or five miles then turned up and ascended the top of the lava capped mesa at about 3700 ft. north of the Triplets, passing thence over the mesa, turning easterly near the north base ^{low} of the Triplets. Reached camp after dark.

June 3 (Sat.)

Left camp near Warm Spgs. and travelled easterly about 25 miles, at last, to the point where Ash Creek emerges from the Nantan Plateau. Here we camped among sycamores and oaks, along the small stream which disappears and reappears at intervals along the bed of

the creek, at 5200 ft.

June 4 (Sun.). Nine mi. Spring
Left camp on Ash Creek and travelled southeast about 10 miles to Nine Mile Spring (5150 ft.). Here we camped in an open, upland flat under a hackberry tree where the wind had considerable force.

Road crossed Ash Flat somewhat diagonally. This flat is about 12 miles in length and six miles in width and forms the watershed between the Gila Bonita and Ash Creeks. The surface is only slightly rolling, the soil rather loose, but not sandy and apparently formed of decomposed lava. The dominant shrub is the common *Gutierrezia* which ranges so widely at about the same elevation elsewhere. In fact this shrub is about the only one over most of the flat. ~~Agave~~ *angustissima* and *Agave parryi* occur in places, largely in groups. Lava beds occur near Chincabra Ranch, but the general surface of Ash Flat is clear of rock.

Nine Mile Spring, water here runs in several places on level ground.

Mountain Plateau - The escarpment is very steep all along this part of the southern side and extends to an outstanding eastern point of the range. Yellow pines are visible along the crest to a point a few miles east of the north and south line through our camp where the range becomes lower and although a few yellow pines persist on several high points the general area apparently becomes Upper Sonoran.

The afternoon was devoted to the setting of steel traps for prairie dogs numerous burrows of which were found near our camp.

(4700 ft.)

June 5 (Mon.) Chiricahua Ranch,

Several prairie dogs were trapped but on the whole we have better luck shooting them. 19 were secured by noon and in the afternoon we moved to Chiricahua Ranch, about 12 mi., where we camped under the trees along Ash Creek in the canyon above the house.

June 6 (Tue)

Remained working in the vicinity of Chiricahua Ranch.

Alt. Trees along Ash Creek here 4700 ft., as it passes through canyon about 200 ft. deep are Juglans^{major}, Quercus arizonica, L. unguis, Platanus wrightii, Fraxinus velutina and Prunus (common sp.), the relative abundance in order named. On south sloping side of canyon Nolina, Yucca, Morus and Mimosa truncifera grow together.

June 7 (Wed.) Gila Mts. (4700 ft.)

Finished work at Chiricahua Ranch and at 3 P.M. left by the freight road to Calva. Road ascended gradually for about 5 miles to the summit of the Gila Mts. at about 5000 ft. where it crossed and we camped below the summit about a mile farther on where a small arroyo cuts the broken southern side of the Range. Total distance travelled about 6 miles.

Gila Range - From Ash Flat the general level rises only slightly and gradually to the top of the chain of hills known as

the Gila Range which from the south appears much more prominent.

June 8 (Thurs.) Calva, Ariz. ^(2600 ft.)
Left camp at 4700 ft. just below rim of plateau, and descended ^{south} to Calva (12 mi) on the Arizona Eastern R.R. along the Gila River. Road continued across an irregular terrace ^{for about a mile} then began descending more rapidly, but was nowhere steep, the wagon road following ridges inclining downward in a long easy slope to the River.

Gila Range. On southern side where traversed by the wagon road to Chincalwa Ranch the slopes below the rim are broken, but not precipitous as far as to the east where a rugged group of mountains stand out along the rim.

We camped near the auction house where the foreman's wife, Mrs. Holland undertook to provide supper for us, after our arrival at 5.45 P.M. We had left camp about 2 P.M.

June 9 (Fri.) Mt. Humboldt, Ariz.
(Camp at 4500 ft.) Finished specimens

Calva
tripped last night and left about 2.40 P.M. for the slopes of Mt. Humboldt. We turned up a broad wash a short distance west of Calva and ascended steadily along washes and ridges, bearing toward the western flank of the mountain until about 5.30 P.M. when we made camp on a clear stream in a small canyon largely filled with sycamore, and oak timber and near the northern base of the main mountain. Distance travelled about 8 miles.

June 10 (Sat.) Mt. Humboldt.
From camp at 4500 ft. at north base Taylor and I rode up to 7000 on the western shoulder of the mountain where we tied our horses and proceeded westward to the summit of the main peak on foot. We had some difficulty in working our way along the crest owing to dense brush and steep slopes but finally came out on the extreme top of the peak at 3.45 P.M. after a few minutes survey of the country we were obliged to hurry back to our

horses in order to reach camp before night. Total distance up & down probably not over 6 miles, but progress was very slow, owing to dense brush and steep slopes.

Mt. Turnbull. The mountain is very steep on all sides, but not particularly steep very near the summit. The general upper slopes are densely covered with oak brush in many places. On northern slopes above 6000 ft. are dense patches of Quercus monspiciensis and Robinia neomexicana the oak predominates. In a few places Pinus ponderosa, Quercus hypoleuca, Q. gambelii and Ceanothus Gordii form patches of nearly pure Traveller's tree.

June 11 (Sun.) Mt. Turnbull.
Remained working at camp at 4500 ft. on north basal slope.

June 12 (Mon.). Rice, Ariz.
Finished work on Mt. Turnbull and started back to Rice at 2 P.M.

Route chosen was across country down ridges and washes to the railroad a short distance east of the bridge ^{on the wagon road} across the Gila. We crossed the bridge about 4.45 P.M. and shortly after 5 stopped in a cottonwood grove near the river where supper was prepared and we rested about two hours, after which we proceeded on to Rice by the wagon road, arriving at 11.15 P.M. The wagon road from near the river turns northward across the mesa, cutting across the angle between the Gila and San Carlos rivers. Total distance travelled about 30 miles.

June 13 (Tue.).

Spent most of day in packing specimens and outfit at Rice and left ^{at 8.15} in evening on train for Globe where we arrived about 9 o'clock.

June 14 (Wed.)

Remained at Globe where arrangements were made to take stage tomorrow for Phoenix.

June 15 (Thurs.) Phoenix, Ariz.
Left Globe about 8 A.M. and
travelled 120 miles by auto stage over
the Old Apache Trail to Phoenix where
we arrived at 6 P.M.

Picked up Jackson at Fish Creek.
Road runs through Lower Sonoran Zone
all the way except for a short distance
east of Roosevelt Dam. Passed Roosevelt
and the Dam shortly before noon.
The most picturesque country is below
the Dam where the general region
is very rugged and broken although
the mountains are very low.

June 16 (Fri.) Phoenix, Ariz.
Remained at Phoenix preparing reports
and bringing correspondence up to date.

June 17 (Sat.) Phoenix, Ariz.
Remained at Phoenix, gathering
information and organizing outfit
for further work.

June 18 (Sun.) Phoenix, Ariz.
Remained at Phoenix.

June 19 (Mon.) En route
to Calif. Taylor, Jackson and Vrooman
left in morning for Congress
Junction. ^{John B.} Vrooman has just joined
our party and is to serve as
field assistant during the summer.
I finished preparations for
work in California and left
for Bakersfield, Calif. at 6 P.M.

June 20 (Tue.) En route to
Bakersfield, Calif.

Arrived at Los Angeles at 8.45
A.M. my train about an hour or
a half late causing me to miss
my connection there and I find
it necessary to stay over in L.A.
until 10.15 P.M. when I resumed
my journey. Spent most of the
day visiting some cousins I had
not seen in many years. Found
John Ziegen at his office and
went with him to his house
at 322 S. Reno St.

June 21 (Wed.) Bakersfield, Cal.
Arrived at B. at 8.45 A.M. Spent part

of day gathering information relative to work in Cuyama Valley, and preparing reports.

June 22. Bakersfield, Calif.

Preparing reports and organizing outfit for further work. Reports finished.

June 23. Bakersfield, Calif.

Made trip to Buttonwillow to see Mr. Egle, the superintendent for Miller & Lutz in regard to permission for work in Cuyama Valley, but learned that Miller & Lutz no longer have any interest there. The leases under which they were operating have expired and were not renewed.

June 24. Maricopa, Calif.

Left Bakersfield at 9.30 A.M. for Maricopa where I arrived via Sunset Ry. at 11.40. Arranged in afternoon to go out into Cuyama Valley in the morning.

June 25, Cuyama Valley.
Left Maricopa at 8 A.M. and

reached the Wylie Ranch in Cuyama Valley, 20 miles from Maricopa about ~~10.30~~ 10.30 A.M., going out with G.W. Downing of Maricopa. Arranged to stay at the ranch which seems to be a convenient point from which to work the upper part of the valley.

Road led up a well-made grade over a ridge at about 2500 ft. and descended thence about 300 ft. to the ranch at 2200 ft. The ridge is nearly bare of ligenous vegetation but at this low point is ^{apparently} mainly Lower Sonoran in character and forms a narrow division between the Cuyama and San Joaquin Valleys. The ridge is steep in places, but not rocky.

Traps were set in afternoon.

June 26, Cuyama Valley (Wylie Ranch).

Traps were set mainly for carnivores along the Cuyama River. The river sinks in the sand

about 20 miles above this point and reappears near here. A number of birds were taken today.

June 27 Cuyawa Valley
(Wylie Ranch).

Continue trapping for carnivores and bird collecting. Caught a Lyne

June 28. Cuyawa Valley
(Wylie Ranch).

Continue bird collecting and trapping for carnivores. Took another Lyne today in same trap and at same spot one was caught yesterday.

June 29 Cuyawa Valley
(Wylie Ranch).

Trapping in bottom of valley, mainly for small mammals.

June 30. Cuyawa Valley
(Wylie Ranch). A varied collection of small mammals was taken in the bottom of the valley.

July 1 Cuyawa Valley
(Wylie Ranch). After visiting traps set in bottom of valley prepared account and made a hurried trip

to Maricopa with Mr. Wylie in afternoon. Returning in evening across the summit of the ridge between Cuyawa and San Joaquin valleys three of the back wheels of the machine had the tire wrenched off and the wheel crushed. The wheel rolled like a hoop across a bend in the road and brought up with a bump against the upper side of the grade.

July 2 (Sun.) Cuyawa Valley (Wylie Ranch). Made up a series of ^{specimens of} small mammals trapped yesterday.

July 3 (Mon.) Cuyawa Valley (Wylie Ranch).

Spent the forenoon on a trip to hills on southern side of Valley to a point about 5 miles southeast of Cuyawa Ranch. The valley on this side slopes up rather gradually through low ridges overgrown with the giant Euphorbia, Juncus californica

the oaks and juniper pines beginning near the base of the higher mountains. The giant Ephedra, which occurs also on the valley bottom a short distance above the head of the water in this vicinity, occurs somewhat lower than the junipers along the south side, but is soon succeeded by them, the two overlapping for a short distance.

Afternoon was devoted to setting steel traps for carnivores in the bottom of the valley.

July 4 (Tue). Cuyawa Valley (Wylie Ranch).

Made round of traps in morning and went to Caliente Ranch, ^{13 mi. SW.} to a celebration which brought together most of the people in the valley where I was able to gather considerable information. Returned to Wylie Ranch with the family in evening.

July 5 (Wed.) Wylie Ranch. Spent entire day in setting traps.

July 6 (Thurs.) Wylie Ranch. About 45 specimens were taken in

traps of which a part were saved.

July 7 (Fri.). Wylie Ranch, Cuyawa Valley. Additional specimens taken in traps were prepared.

July 8 (Sat.) Cuyawa Valley (Wylie Ranch). Made a trip to town (Maricopa) with Mr. Wylie to attend to correspondence and other business matters. Returned to ranch soon after noon and in afternoon set additional traps in the juniper belt southwest of the ranch.

July 9 (Sun) Cuyawa Val. (Wylie Ranch). Visited traps and spent most of remainder of day preparing specimens.

July 10 (Mon.) Cuyawa Val. Johnston Ranch. Left Wylie Ranch and travelled 40 miles by wagon to Johnston Ranch about a mile below the extreme lower end of Cuyawa

Valley and 9 miles west of Spanish Ranch. Some traps were set in the afternoon near the ranch. Left Wylie's at 8 A.M. and arrived at Johnston's about 4 P.M.

July 11 (Tue). Cuyama Valley, Johnston Ranch. Rode up valley and set traps near Spanish Ranch.

July 12 (Wed). Cuyama Val. Johnston Ranch. Finding traps and preparing specimens later near Spanish Ranch, 9 miles east of Johnston Ranch. Specimens included Perodipus rogersi.

July 13 (Thurs.) Cuyama Val., Johnston Ranch. Continue working near Spanish Ranch and at extreme lower end of valley.

July 14 (Fri.) Cuyama Valley (Wylie Ranch). Left Johnston Ranch about 8 A.M. and returned about 40 miles to Wylie Ranch, arriving about 5 P.M.

July 15 (Sat.) Bakersfield, Calif. Hunted birds in early morning in Cuyama Valley and after preparing specimens drove in afternoon 20 mi. by auto to Maricopa and took train for Bakersfield at 4.20 P.M. arriving at Bakersfield at 6 P.M.

July 16th to Aug. 12th.
Awaiting funds with which to return and continue work in Arizona.

Aug. 13th
Left Bakersfield 8.20 A.M. for Arizona. Arrived at Bartow at 1.35 where I was obliged to wait until 7.46 P.M. for the train from Los Angeles to Phoenix, via Parker.

Aug. 14th Phoenix, Ariz.
Arrived at Phoenix at 7.35 A.M. where I spent the day getting outfit. Left here June 19th and preparing to leave tomorrow for Clarkdale.

Aug. 15, Elarkdale, Ariz. (3400 ft.)

Left Phoenix 7.45 A.M. and arrived Elarkdale about 9.30 P.M., on delayed train due at 5.50 P.M.

Railroad traversed level plains from Phoenix to a point a few miles south of Wickenburg where it enters low hills, following the narrow valley of Hassayampa River, ^{which flows through them} as far as Wickenburg. North of Wickenburg the road enters a rolling plains country extending to the base of the Weaver Mts. which rise abruptly from it. This Lower Sonoran plain is overgrown with Leovillea, Prosopis, Acacia greggii, Leucodermis, Ceanothus, Yucca rostrata and Ceanothus. The road ascends gradually, the general direction being northward along the west side of the Weaver Mts. as far as Hillside, ^{at 3800 ft.} which is located on a rolling lava plain and the ranker growth of desert vegetation has disappeared. Gutierrezia and a few Acacia constricta are the most conspicuous plants as the upper edge of Lower Sonoran zone is approached. The St. Cloud Mts. west of Hillside

are low and evidently unimportant and apparently do not rise into upper Sonoran zone, or at least barely reach its boundary. From Hillside the R.R. turns abruptly east and climbing rapidly crosses a northern spur of the Weaver Mts. descending thence into ~~shall~~ valley to Kirkland at 3900 ft. in the upper part of ~~upper~~ Lower Sonoran zone. The Weaver Mts. are rugged, but soil is scanty and they appear to bear only rather thin brush on their western slopes. At Kirkland upper and Lower Sonoran zone elements are mixed on north slopes. Near Kirkland the road again turns northward or northeastward and approaches the pine-covered Sierra Prieta which is crossed at about ^{at 5300 ft.} 6000 ft. and the descent to Prescott is rapid. From Prescott the route continued northward and from the P. & E. Junction strikes ^{plains} across open country, grassy or overgrown with Gutierrezia, descending slightly to Del Rio, a dairy farm, and

ascending again and entering a growth of junipers near Cedar Glade at 4600 ft. The drainage from the region between Prescott and Cedar Glade is into the Verde River. The Black Mesa appears as a low, cedar covered ridge west of Cedar Glade. From Cedar Glade the road turns southward and descends rapidly to the Verde River a short distance above Perkinsville at 3900 ft. near boundary between Upper and Lower Sonoran Zones, descending thence along the Verde Canyon to Clarkdale.

Aug. 16, Clarkdale, Ariz.

Remained at Clarkdale, reorganizing outfit and preparing to take up field work.

Aug. 17, Camp Verde, Ariz.

Completed preparations at Clarkdale and at 1 P.M. left ^{for} Camp Verde where Jackson and I arrived about 3 P.M. Remainder of day devoted to gathering data from people in regard to country. Road descended the Verde Valley,

keeping the river on our left all the way. The bottom of the valley is very narrow and arable land is limited. Rolling hills and mesas extend back to the "rim" on the eastern side and to the base of a steep slope on the western side.

Aug. 18 Apache Maud Mt. ^(6200 ft.) Ariz.

Left Camp Verde at 11 A.M. by auto and travelled about 37 to Apache Maud Mt., plus several miles additional via Stoneman Lake. We arrived late in the evening having been delayed by tire troubles.

Route led up steadily past Montezuma Well where ^(about a mile) we stopped for lunch. The well being a short distance off the main road. The well is perhaps a hundred yards in diameter and nearly circular. The formation at that point is limestone and the well was probably formed by the caving in of a limestone cave. The water from the well is heavily charged with lime, and ditches used by a prehistoric people are thickly coated several inches thick the deposit. These ^{ancient} ditches were ^{apparently} used to irrigate land

along Beaver Creek valley. The "rim" which is so well-marked along the Verde Valley and Pinto Basin is little evident between Clear Creek and Oak Creek and we ascended mainly through Lower Sonoran zone to the border of the Transition zone near Stoneman Lake and Apache Maid Mt.

Aug. 19, Stoneman Lake & Apache Maid Mt.

In the morning a trip was made to the summit of Apache Maid Mt. (7000 ft.) from which I obtained fine views and a good idea of the life zones for many miles in all directions. A little east of south Baker Butte appeared as a low eminence on the horizon and farther west, but still east of south I could see the northern end of the Matagalpa Range. A good view of the Broadshaw Mts was obtained, ^{so over} across the mountains bordering the ~~Verde~~ ^{Verde} Valley. To the north San Francisco, Kendrick Peak, Sitgreaves and Bill Williams mts. were all clearly visible. In the afternoon

we took traps to Stoneman Lake about 5 miles distant and set them along the marshy course of a stream flowing from a spring. Stoneman Lake is said to be higher than usual.

Aug. 20 (Sun.) ^{ranch & fire} Apache Maid Mt.
Traps at Stoneman Lake yielded few specimens. A large setting was put out near Apache Maid Mt.

Aug. 21 (Mon.) Camp Verde, Ariz.
Left Apache Maid Mt. and travelled by auto back to Camp Verde, about 37 miles. Homer Cummings who took Jackson and I to the ranch near Apache Maid on the 18th returned for us today. Left Apache Maid about 2:30 P.M. and arrived at Camp Verde, 6 P.M.

Aug. 22 (Tue.) Prescott, Ariz.
Left Camp Verde at 7:40 A.M. by auto and arrived at Prescott about noon. - distance travelled about 50 miles. Road ~~started~~ ^{started} out of the Verde Valley, ascending by an easy grade over a summit at about 5000 ft. and down and across the upper end of

the Agua Fria Valley at about 4500 ft.,
thence up over another divide at
about 5400 ft. and down a short
distance to Prescott. The entire route
traverses Upper Sonoran zone which
extends down somewhat lower on
the west side than on the east
side of the Verde Valley, the lower
limit on the west side being at
about 3500 ft.

Aug. 23 (Wed.) Prescott, Ariz.

Remained at camp Verde Prescott
working on reports and gathering
data for use in further work.

From Forest Supervisor Chas. H. Hinderer
I secured considerable information in
regard to Prescott Nat. Forest.

Aug. 24 (Thurs.) Crown King, Ariz.

Left Prescott 8 a.m. and arrived
at Crown King at 12.45 P.M. by rail.
Railroad leaving Prescott skirted
Lonesome Valley and through a broad
low Upper Sonoran Pass entered valley
of Agua Fria River which was
skirted, the railroad extending down

through rough country along the
west side of the valley to Turkey
Creek. In fact the entire valley
is said to be rough and much cut
by arroyos and canyons. The road
descends gradually to about 3400 ft.
in Lower Sonoran zone at Turkey
Creek where it turns abruptly and
ascends by a series of switchbacks
to Crown King at 5600 ft. in the
Bradshaw Mts. Traps were set in
afternoon.

Aug. 25 (Fri.) Crown King, Ariz.

Field work was carried on near
Crown King and along the ridges
to the south of the town toward
Borsethief Mountain. In afternoon I rode
to top of Tower Mt. about 4 mi. N. of town.

Aug. 26 (Sat.) Crown King, Ariz.

Traps set near Crown King were
gathered and I rode up on horseback
to near top of Tower Mt. where they
were set, largely for Microtus. The
summit of Tower Mt. affords splendid
views in all directions, especially
toward the south, but owing to
raining or overcast conditions I

was unable to get ^{fully} satisfactory details of the country.

Aug. 27 (Sun) Crown King, Ariz.
Another trip was made to summit of Crown King to bring down traps set yesterday. Returned to Crown King about noon with traps and in afternoon rode up again with camera to get views. Weather has cleared somewhat and is the temperature is very agreeable - neither hot nor cold.

Aug. 28 (Mon) Turkey Creek, Ariz.
Prepared specimens at Crown King and packed outfit preparatory to leaving at 1:15 P.M. for Turkey Creek where Jackson and I arrived at 2:48 P.M. and immediately unpacked and set a number of traps for mammals. Weather is very noticeably hotter than at Crown King - temperature about 100° at time of our arrival.

Aug. 29 (Tue.) Turkey Cr. Ariz.
Traps were gathered before breakfast.

A number of species of mammals were taken in spite of the fact that a very heavy rain fell last night. After breakfast we accompanied two prospectors to some old tunnels along Turkey Creek where we were assured many bats would be found. Bats evidently inhabit the tunnels at times, but we found only one - a Georynorhinus which was startled from its resting place and knocked down as it flew past me. Most of the afternoon was devoted to preparing specimens.

Aug. 30 (Wed.) Turkey Creek.
In the morning I worked along the upper part of Turkey Creek and located favorable-looking places in which to set traps in the afternoon when all the small traps available were placed - special efforts being made to trap Sigmodon along the border of a field planted to sorghum.

Aug. 31 (Thurs.) Prescott, Ariz.
Traps were gathered and after

preparing specimens including a *Sigmodon* we packed up and prepared to take the afternoon train to Prescott. Leaving Turkey Creek at 2.48 P.M. we arrived at Prescott about 6.15 P.M. where we found Dr. Taylor had already arrived from the Juniper Mts. earlier in the day.

Sept. 1 (Fri.) Prescott.

Remained at Prescott preparing accounts and reports.

Sept. 2 (Sat.) Williams, Ariz.

Continued work on reports until afternoon when we took train at 1.43 and arrived at Williams about 7.45 P.M. the train delayed.

Route from Prescott was through Upper Sonoran zone to a point a few miles west of Williams where it enters the pine belt. From Cedar Glade north to Ash Fork at 5100 ft. the general surface is rolling lava beds country cut by arroyos which seem to descend into Chino Valley.

Sept. 3 (Sun.) Grand Canyon, Ariz.

Left Williams Ariz. 2 P.M. and arrived at Grand Canyon over Grand Canyon Ry. about 4.30, the distance from Williams about 64 miles.

General route is over the undulating plateau, descending gradually from Williams at about 6550 ft. to Valle and Anita at 5800 ft. thence rising ^{rather rapidly} gradually into yellow pine forest at 6300 to 6800 and over 7000 ft. along the rim of the canyon. Shortly after leaving Williams Mt. Sitgreaves becomes visible and farther to the right and farther away, looking somewhat dim and blue in the farther distance San Francisco Mt. was visible. Kendrick Peak soon appeared from behind a hill in the foreground. Soon after leaving Williams the pines are left behind and the railroad enters a broad plain overgrown with piñon and juniper. South of the Valle the plain becomes open and overgrown mainly with *Atriplex* and *Gutierrezia*, the north of Anita where the climb

begins and the road soon enters a limestone region of Pinus (pinon), Artemisia tridentata, Chamaebatia millefolium, Yucca baccata, Juniperus monosperma, Cephaelis, Fallugia parodora and Leonaria muscivora. On reaching a level of about 6300 ft. yellow pine and Artemisia tridentata become in places the dominant species, even occurring almost to the exclusion of other ligneous species, but many Upper Sonoran species occur on southerly exposures.

We found fairly comfortable quarters at Bright Angel Camp at \$1.50 per day.

Sept. 4 (Mon.) Grand Canyon.

Preparing reports.

Sept. 5 (Tue.) Grand Canyon.

Preparing reports and gathering data relative to work in canyon.

Sept. 6 (Wed.) Grand Canyon.

Preparing reports and gathering data.

Sept. 7 (Thurs.) Grand Canyon.

Arranged to leave tomorrow on a trip into Grand Canyon near Bass Camp.

(6600 ft.)

Sept. 8 (Fri.). Bass Camp.

Left Grand Canyon about 9 A.M. and travelled ^{by wagon} 25 miles northwesterly to Bass Camp where with Taylor and Jackson I arrived about 3 P.M. Hops were set along the rim of the canyon later in the afternoon.

Road led through pine forest for a few miles, descending gradually along an arroyo leading southward toward Cataract Canyon, and after crossing an undulating area timbered with juniper and pinon pine turned back toward the canyon emerging on the rim at one point and again turning off to return at Bass Camp. Bass Camp is a camp established many years ago by W.W. Bass who informs me that he took the first load of tourists to canyon at this point over a road he built out from Ashfork. Below the rim at this point are rather extensive benches or plateaus in the red sandstone formation below the vertical wall

of gray sandstone.

Sept. 9 (Sat.) Rock Camp, in Bass Canyon, Grand Canyon.

Took up traps set yesterday and moved down Bass Canyon about 6 miles to Rock Camp within about one mile of the Colorado River. Left Bass Camp about 10 A.M. and arrived at Rock Camp about 2.30 P.M. Remainder of day was devoted to preparing specimens taken last night in traps set near Bass Camp.

Sept. 10 (Sun) Shinnus Creek.

Jackson, Taylor and I took all available small traps on our backs and walked about 2 miles to Bass Ferry where we crossed the river on the trolley, a cage running on cables suspended 65 feet above the River and operated by a windlass. The equipment for making the crossing was in dilapidated condition and rather difficult to operate. From the ferry we found a trail bearing upward and to the left or westward which led us across a ridge and

down to Shinnus Creek at about 2000 ft. Ascending the creek, which proved to be a strong stream slightly clouded by a recent rain, a short distance we came to "Shinnus Garden". Here the bottom of the canyon broadens slightly and there is an acre or two of land on a bench beside the creek where Mr. Bass formerly grew vegetables and some fruit.

Two small peach trees were the only remaining traces I saw of crops formerly grown. After exploring the vicinity of the "Garden" where there is still an old camp and the remains of tents we climbed up to the top of the fairly extensive bench in the Tonto formation where a search was made for Ammonoferophilus lucorum. We found no traces, however, and the entire area is evidently exceedingly barren, the bench overgrown with Lesqueria ramosissima as on the southern

side of the canyon. Traps were
set along Shinnu Creek ~~and a~~
~~good series of three species of~~
~~mammals~~ ~~etc~~ and we camped
for the night at the "Garden"
utilizing some old bedding and
some flour, the latter the only
provision found at the camp.

Sept. 11, Redrock Camp.

After a rather unsatisfactory breakfast of cakes made of flour and water, there being no baking powder available we returned to Redrock Camp on the south side of the River. Most of the remainder of the day was spent in the preparation of specimens. I was able to set a few traps shortly before dark.

Sept. 12, Redrock Camp, Grand
Canyon.

A large set of traps was placed on the bench in the Tonto formation near Redrock camp and specimens taken last night were prepared.

Sept. 13. Redrock Camp
Took up traps and prepared

specimens later on Porto formation.

Sept. 14, Bass Camp. Good Camp.
Bert Tugon, Mr. Bass guide, came
down and packed by outfit to the
rim and I climbed up to Bass
camp. Jackson and Taylor carried
up traps which were set on the
~~red stone~~ red sandstone bench
at 5200 ft., after which they
also climbed on up to Bass
camp for the night.

Sept. 15, Grand Canyon.

Left Bass Camp about 9 A.M.
on horseback and returned 25 miles
to the railroad at Grand Canyon,
arriving about 2 P.M. Devoted
remainder of day to overhauling
outfit. Jackson & Taylor were left to finish
work near Bass Camp.

Sept. 16, Grand Canyon.

Sprint day in overhauling outfit
and preparing reports.

Sept. 17. En route to Noola.
Left Grand Canyon at 8.30 A.M.
and transferring to west bound train
at Williams, took train to Calif in
route to Noola.

Berkeley
Sept. 18. ~~Sacramento~~, Calif.
When I awakened this morning
train was passing Tehachapi.
Arrived in evening at Stockton where
I decided to leave official route
and make a side trip to Berkeley.
Would have arrived at ~~Sacramento~~ at 6:20 P.M.

Sept. 19. - Berkeley, Calif.
Spent the day with mother
and sister at Berkeley. In afternoon
saw Grinnell and Bryant at U.C.
Day off on annual leave.

~~Sept. 20th~~
Left Berkeley in evening and took
up official journey at Sacramento at
10:55 P.M.

Sept. 20th, Winnemucca, Nev.
Woke up near Truckee the train
descending the eastern slope of the
Sierras. Yellow pines looked dark
and straight in the early morning
light. They do not appear to spread
so widely as the yellow pine of
Arizona. Weather warm and as usual
in Nevada bright and clear and in
contrast with smoky conditions seen
in San Joaquin Valley. Arrived at
Winnemucca at 3 P.M. where I found

E. R. Sans had been gathering some
information relative to the location
of beavers for me.

Sept. 21. Winnemucca, Nev.
Made a trip to Golconda today,
leaving Winn. at 5:55 A.M. and
returning at 5:34 P.M. ^{6:00 M - 6:35} to try to
locate beavers in that vicinity.
Learned that some can probably
be obtained near Iron Point, 16 mi.
farther east. Tramped along the
river at Golconda today, accompanied
by E. R. Sans.

Sept. 22 (Fri) Winnemucca, Nev.
Gathering data in regard to the
occurrence of beavers near
Winnemucca.

Sept. 23 (Sat.) Winnemucca, Nev.
Prepared reports, packed specimens,
and reorganized field outfit. Also
made trip to points on river to search
for beavers.

Sept. 24 (Sun.) Winnemucca, Nev.
Remained at Winnemucca. Most of day
devoted to correspondence. Went down
along river with E. R. Sans and J. E.

Pipe in the evening. Weather clear and fairly warm.

Sept. 25 (Mon.). Iron Point
Packed up today and took 3 P.M. train about 36 miles to Iron Point where I arrived at 4.10 P.M. Walked out $1\frac{1}{2}$ miles to ranch of Geo. Bain where I had been informed by Mr. Bain I might be able to trap some beavers, at a place where they are reported to be making trouble by turning the water out of a ditch from the Humboldt River.

Sky was partly overcast this evening and it has turned quite chilly, wind is blowing and sounds cold and blustering - colder than it really is.

Walking out from the railroad I crossed a broad alkaline flat overgrown with Sarcobatus? - a fleshy-leaved shrub growing here as a dominant.

Sept. 26 (Tue.) Iron Point. Nev.
Spent entire day setting traps for

beavers along the Humboldt Riv. on Mr. Bain's ranch. The beavers have a small dam in a head gate where water is turned from the river. Judging from visible signs, however, they do not appear to be very numerous. A number of places were seen where beavers occasionally climb banks, but I found none that are used very regularly.

Sept. 27 (Wed.) Iron Point.
Trapping for beaver on Bain's Ranch.
Sept. 28-29 (Thurs. - Fri.).
Iron Point. Continue trapping for beavers on Bain's Ranch.

Sept. 30 (Sat.). Winnemucca.
Took up beaver trap line at Bain's Ranch and at 5.45 P.M. returned to Winnemucca, arriving about 7 P.M. One beaver was taken last night.

Oct. 1 (Sun). Winnemucca, Nev.
Remained at Winnemucca, doing correspondence up to date etc. morning spent preparing specimens.
Oct. 2 (Mon). Winnemucca, Nev.

In morning met Mr. Burch and made arrangements for him to do some beaver trapping while I take up work on mountain

In afternoon noon packed up and transferred outfit to station and finished preparing accounts ^{and reports} for last month.

(Tue.)
Oct. 3, Ely, Nev. 6.40

Left Winnemucca with S.E. Piper at 5.55 A.M. (train late); arrived at Cobre at 12.45; left Cobre at 1 P.M. and arrived at Ely at 5.15 P.M.

In evening met J.H. Eager, who is in charge of various interests of the Adams & McGill Co., also Mr. McGill's son; arranged to leave at 9 A.M. tomorrow for Cleveland Ranch with Mr. Eager.

Road today across northern Nevada was along the Humboldt much of the way. From Cobre the railroad runs south over a nearly level plain, but ascending gradually to Ely. In building the road practically no grading was necessary. Mountain ranges on either side are covered with snow, and we ran into a snow storm as we approached Ely. Stop at Northern Hotel.

Oct. 4 (Wed.) Cleveland Ranch, Nev.
10.30

Left Winnemucca at 8 A.M. and arrived at Cleveland Ranch about 2 P.M. distance covered about 47 miles from

Ely. Much snow fell last night and covers the mountains deeply, and makes bad roads today, snow is melting rapidly however at the lower elevations. I met R.T. Swallow who owns the ranch at Shoshone and through whom Mr. Eager advised me to try to get outfit for sheep hunting in Snake Range, Mt.

Oct. 5 (Thurs.) Cleveland Ranch, Nev.

I expected to go to Shoshone with Mr. Swallow today but bad roads make the trip impossible with machine. He is going through on horseback and will return for me as soon as weather permits. Met Mr. Smider at Cleveland Ranch.

Oct. 6 (Fri.) Cleveland Ranch, Nev.

Weather stormy most of day and practically nothing accomplished - waiting for transportation to Shoshone.

Oct. 7 (Sat.) Shoshone, Nev.

Weather clear, but very windy today and decidedly cool. Mr. J.M. Fox came up for me from Shoshone ^{at 2} in afternoon and I arrived at latter place at 5 P.M. distance travelled 30 miles.

Oct. 8 (Sun.) Shoshone, Nev.

Weather good today - Tried in afternoon to make arrangements to get a man to

leave with me for the Snake Range tomorrow. Partial arrangements were made, but man refused to go at last moment.

Oct. 9 (Mon.) Shoshone, Nev.
Made a trip about 9 miles north to look for a man to go into hills with me. Nearly all the men are busy, many of them just now digging potatoes. Finally arrange in afternoon for a man to leave with me tomorrow. Returned to Shoshone in evening.

Oct. 10 (Tue.) Snake Range, Nev.
Left Shoshone about 8 A.M. with Mr. J. M. Fox and hunter. Mr. Fox goes up to bring down pack and saddle animals. We ascended the steep western side of the range intending to camp at a cabin at the St. Lawrence mine at about 10000 ft. near timber line, but the snow increased rapidly in depth as we ascended and reached a depth of about 2 ft. at the mine. The weather meanwhile became threatening again and I decided

it would be useless to look for sheep on the crest of the range at this time. It was evident that along the crest the snow would be much deeper still. Snow that fell a week ago still lies heavily on the trees and those ^{have} ~~continually~~ been little melting. So I decided to return part way and camp near the lower edge of the snow line. It began to snow again in the evening. Our camp on the slope is at 7800 ft. in pole canyon. Mr. Fox returned with the stock to the ranch.

Oct. 11 (Wed.) Snake Range
(Camp at 7800 ft.) It snowed nearly all day and I was able to do little hunting.

Oct. 12 (Thurs.) Snake Range
(Camp at 7800 ft.) Spent day hunting along west slopes of Snake Range. Saw a few deer tracks and Lawrence Ramsey jumped two but was unable to get a shot. Was again somewhat by snow which continues to fall.

to Cleveland Ranch

Oct. 13 (Fri.) Shoshone Ranch,

Returned to Shoshone at noon today. Mr. Swallow (Richard) sent a man up according to previous arrangement to bring my outfit down. Weather is partially clear, but threatening today. On way down I shot a coyote. In ^(1 P.M.) afternoon Mr. Fox took me by auto to Cleveland, ^(30 miles) where I arrived about 5 P.M. ^{Ranch}

Oct. 14. Cleveland Ranch.

It rained steadily nearly the entire day and I was unable to get into hills as I had planned. In the evening I met Alex Kolchuk and arranged to go up to his place in the Shell Creek Range after sheep.

Oct. 15 (Sun.) Cleveland Ranch.

Kolchuk was obliged to make a trip near Baker today and we will not be able to start for the hills until tomorrow.

Oct. 16 (Mon.) Shell Creek Range

Left Cleveland Ranch with Kolchuk by ^{at 8 A.M.} buggy and arrived at his place at 8700 ft. in the mountains shortly before noon. Indian Sam who knows where to look for sheep was out hunting deer and the horses were on the range so we were obliged

to wait until he returned in the evening.

Road to Kolchuk's place today led from Cleveland Ranch in a general southwesterly direction up Cleveland Creek, climbing up rather rapidly and in places rather steeply into the hills by a fairly good road along the bottom of the canyon. Frost had turned patches of quaking aspen deep yellow and clumps of cornus along the creek were deep red and contrasted sharply with the general gray of the landscape. Weather appears to have cleared at last.

Oct. 17 (Tue.) Shell Creek Range.

It took until nearly noon to catch horses and organize outfit for trip into hills to the southward of Kolchuk's place. Leaving Kolchuk's camp the southern side of the range was skirted at a low elevation and we camped near the base of a high cliff said to be a place frequented by sheep. Snow furnished water for camp use. Arrived and made camp about 5 P.M., the sun already set.

Oct. 18 (Wed.) Shell Lk. Range.

Hunted off to the southward near the head of Barton Lk. today and late in the afternoon saw 6 sheep, 5 ewes and a lamb - feeding ^{among the meadows of} along the base of a cliff low down. It being too late to try to approach them today we are going after them tomorrow. Weather clear but windy.

Oct. 19 (Thurs.) Shell Lk. Range.

Went out with Kolchek and Indian Sam and surrounded the sheep located yesterday. Sam approached from below and fired three shots at them at ~~a~~ long distance after they had seen him and they ran up within about one hundred and fifty yards of me, but at an unguarded point we did not know about and escaped heading straight for the top of the mountain. After fruitless search for them we ~~left~~ returned to camp late in afternoon.

Oct. 20 (Fri.) Shell Lk. Range.

Hunted all day without seeing sheep. Sam tracked ^{five} ~~three~~ additional sheep for some distance, but they travelled too far for him.

Oct. 21 (Sat.) Shell Lk. Range.

I climbed to a pass sometimes used by sheep in following along the range and spent the day in the vicinity watching. Kolchek watched another pass and Indian Sam trailed some sheep. He saw yesterday. The sheep were finally sighted by him, but had already seen him and were moving off. He fired 6 shots at long range and missed. The sheep ran up the face of a very rugged mountain and escaped.

Oct. 22 (Sun.) ~~Shell Lk. Range.~~ ^{along the crest}

I hunted with Sam ^{along the crest} to the northward ⁱⁿ ~~to~~ new country today, but we saw ^{no} fresh signs of sheep at all. Kolchek hunted lower down. Weather rather windy, but not very bad.

Oct. 23 (Mon.) Shell Lk. Range.

Sam and I made a very long day's hunt up ~~along~~ the crest and south to the extreme southern end of the high part of the range and north again to camp along the slope at a lower elevation. We saw no sheep and few

signs, the ground being frozen hard and the weather very cold and practically no thawing today. Two bunches of deer were seen, however, not far apart. We located them with our glasses, looking down from near the crest of the range. Two seen first were feeding in a small opening among mahogany (*Cercocarpus*) trees and four seen shortly afterward were walking through the mahogany growth about half a mile from where the first ones were seen.

Oct. 24 (Tue.) Shell Lk. Range.

Went out and hunted all day with Sam again. Today we climbed to the crest again and soon after noon I shot a deer which Sam brought to camp. We were much in need of fresh meat. I continued hunting and following the crest skirted the amphitheatre in which we are camped. Saw a few tracks of sheep.

Oct. 25 (Wed.) Shell Lk. Range.

Sam was sent out ^{to Kitchik} for supplies today. Kolchuk & I hunted northward farther than any of us had yet been and

climbed well up toward the crest, examining also the rough country along the slope. Tracks of a single sheep were seen at one place under the crest, but it soon climbed on to rocks and we were unable to follow it. We had lunch at Bowapa Spring (Yellow Ground Spring), a spring said to be known only to the Indians before Kolchuk came into the mountains and probably never visited by any white men except ourselves.

Oct. 26 (Thurs.) Shell Lk. Range.

Sam was again my companion today and we worked through the mahogany belt along the eastern slope of the Range. An old sheep track was seen, part way up a steep slope, but no further signs of sheep were seen although a thorough search was made. Weather fine - today was calm but frost came as usual last night and at the higher levels the ground remains frozen all day. Kolchuk worked today along the crest.

Oct. 27 (Fri.) Shell Lk. Range.

Worked over the crest of the

range today. Found some tracks where two sheep had walked in and out among rock ledges and jagged points in foxtail pine forest. Tracks were most of them apparently a day or two old and I did not find where they left the locality, but in many places they led over solid rock. What sheep could find to eat there would be very attractive to them seems hard to understand, hunting them in such a place is especially difficult. Sam moved camp to a new place.

Oct. 28 (Sat.). Shell Lk. Range.

Kolchek and I worked farther north along the range today, nearer Kolchek's camp where Sam returned in the afternoon with the outfit. I found fresh signs of two sheep that had been feeding early in the day in the lower part of the foxtail pine timber but was unable to locate them. I found 3 beds that had been used last night and had been used several times before. It is clear that sheep may return and use the same beds. These beds, as Jones showed,

had been used several times within the past few days. In one place noted today a sheep had walked through the snow to the end of a fallen log about 18 in. in diam. at the big end which it mounted and after walking it for about 20 ft. jumped off at the upper end into the snow again. Julian Sain tells me that the hunting season for sheep here is in Sept. and lambs are born in April. In the evening I returned to Kolchek's camp finishing a week of hard work over the mountains.

Oct. 29 (Sun.). Shell Lk. Range (Kolchek's camp). No hunting was done today - outfit tired and we all felt like resting.

Oct. 30 (Mon.). Shell Lk. Range.

Hunted sheep all day in the mountains south of Kolchek's camp. Trained two sheep most of day, and finally found the point where they evidently heard us following on the snow and ran off along the crest of the range.

Oct. 31 (Tue.), Ely, Nev.
Left Kolchek's camp with Kolchek
and pack outfit for Ely, climbing
up over the top of the Skull Creek
Range. Left about 9 A.M. and arrived
at Ely about 5.30 P.M. We found
snow so deep on top that we ~~our~~
~~were~~ ~~to~~ ~~have~~ had some
difficulty in floundering through.
Weather cool, but pleasant.

Nov. 1 (Wed.), Ely, Nevada.
Packed outfit and arranged to
leave tomorrow for Washington,
the conditions not favoring
further field work.

Nov. 2-5 - En route
to Washington, D.C. Left Ely 7 A.M.,
arrived Washington 7.15 P.M.

Dec. 27, 1916
Left Washington D.C. at 12.30 A.M.;
arrived New York at 2 A.M. and devoted
remainder of day to ^{official} work examining
mammal specimens in Amer. Mus. Nat.
Hist.

Dec. 28, 1916 to Jan. 7, 1917
Entire period devoted to work at

American Mus. Nat. Hist.

Jan. 8, 1917

Left New York 12.30 A.M. and
arrived at Boston 7 A.M. where
Dr. Thomas Barbour met me and
took me by auto to his house. After
breakfast we went to Mus. Comp.
Zool. in Cambridge where I began
official work on mammals, especially
the Pawawa collection of Mr. Barps.
Remained working in Cambridge
until the even Jan. 11.

Jan. 12, 1917

Left Boston 12.30 A.M.; arrived
New York 7 A.M.; worked until 2.45
P.M. at Amer. Mus. and took 3.30
train for Washington, arriving
home at 8.30 P.M.

July 6-10, 1917

En route from Washington, D.C. to
Flagstaff, Ariz. Left Wash. 7.47 P.M.;
arrived Flagstaff 9.45 A.M.

July 11

Spent at Flagstaff gathering information
and organizing outfit for field work

July 12

Made a trip with forest ranger, Fay to Winona and points in that vicinity to examine the country and arrange with rancher to make trip to Painted Desert. Found a suitable place for work at a ranch and decided to locate there for work.

July 13

At Flagstaff working on some manuscript and completing organization of outfit.

July 14 (Sat) Winona. Ariz.

Left Flagstaff at 7.10 A.M. and arrived at Winona about 7.45. Secured transportation to Carlos Ranch about 3 miles northwest. Remainder of day devoted to setting traps. In afternoon I rode down San Francisco Wash about 4 miles to place traps. Abundant rains have brought up a fair growth of grass. Local showers nearly every day, but so local that many places are left very dry.

Sun set this evening among the clouds behind San Francisco Peak.

Carlos Ranch is growing a crop of potatoes, corn and refs, also a few vegetables - cabbage and beans mainly. Dry farmers in vicinity of Flagstaff appear to be making a success of homesteading.

July 15 (Sun.) Near Winona ^(Carlos Ranch)

Made a trip horseback down about 4 miles along San Francisco Wash on Walnut to a point perhaps 3 miles below Turkey Tanks to visit traps set yesterday. Few specimens were taken that could be saved. A number of white-footed mice taken were thrown away - many of them were partly drowned by ants.

July 16 (Mon.) Near Winona (Carlos Ranch). Made another trip down along San Francisco Wash to point about 3 miles below Turkey Tanks to visit traps which were taken up, the locality proving less favorable than points nearer the ranch.

July 17 (Tue.) Near Winona,
(Carlos Ranch). Working steadily near
ranch. In the morning a search was
made for Citellus s. obsidianus in a
favorable-looking park near Turkey
Parks, but no signs of them were
found and they appear to be
scarce. People at the ranch do not
know them. A very heavy rain fell
in the afternoon. Specimens were
prepared and traps set in evening.
Visited Turkey Parks in morning.
The water is in deep holes - said to be
8 ft. deep in smooth lava or volcanic
rock in the narrow canyon of the
Walnut.

July 18 (Wed.) Near Winona
(Carlos Ranch). Took up traps containing a
number of mice and in morning made
trip to Winona and arranged to leave
Carlos Ranch Saturday with Ed Randolph
as camp man and driver of team on
a trip to Painted Desert. We will
go by way of Flagstaff in order to secure
groceries and horse feed. A heavy rain
began about 10.30 a.m. and lasted,
at intervals nearly all day.

July 19 (Thurs.) Near Winona
(Carlos Ranch). General collecting in the
vicinity of the ranch. Last night over
20 specimens of Perognathus flavus were
secured, ~~mainly~~ in traps set mainly
at holes under bushes. A part of
morning was spent in controlling a
fire set by lightning striking a pine
tree yesterday.

July 20 (Fri.) Near Winona (Carlos
Ranch). Completed work and prepared to
leave in the morning. Put out a
fire started yesterday by lightning
within half a mile of the fire
mentioned yesterday.

July 21 (Sat.)
Left Carlos Ranch and took train at
9.07 to Flagstaff where I arrived at
9.45 a.m. Meanwhile Hoy and driver
of team, Ed. Randolph, hired ~~fore~~
trip to Little Colorado. Brought outfit
to town about 16 miles by wagon.
Supplies were secured, and in
the afternoon we moved out and
camped at the reservoir about 4 mi.
north of town at 7000 ft. altitude.

July 22 (Sun.)

Left camp at reservoir at 7.30 A.M. and travelled northward passing through Fort Valley and Hart Prairie and across the pass at 8500 near Geo. Hochdorff's ranch west of San Francisco Peak and thence by Little Spring to the lower levels north of the mountain. We found roads fenced up by settlers and were somewhat delayed in finding a way through but reached the lower edge of the pines on the old Tuba City road at about 7200 ft. altitude a little ^{west} north of north of the peaks about 7 P.M. Total distance travelled about 25 miles.

Morning was beautifully clear, but heavy thunder showers caught us in afternoon.

July 23 (Mon.) Cedar Ranch Wash

Left camp and travelled about 20 miles north to Rabbit Tank on Cedar Ranch Wash where we arrived about 5 P.M. and Hoy and I at once began setting traps along the canyon.

Road descended gradually all

day. The first section was through the cedar belt which was left behind at about 6500 ft. below which we passed out into open country. A series of lava flows and volcanic cones of varying age were passed along the way. The cedar belt is much like that near Winona, but seems dryer and the trees to do attain such large size.

We travelled slowly and the heat became oppressive, especially in the afternoon. A number of lizards were secured along the road.

July 24 (Tue.) Cedar Ranch Wash. (Rabbit Tank).

Several species of mammals were taken in traps set last night. The forenoon was spent largely in exploration of the country in the vicinity of Black Tank, about 3 miles southeast of Rabbit Tank. We did not actually visit Black Tank, but was near it. No rain had fallen recently near Black

Tank and Mr. Randolph, my camp man, said it would be useless to look for water there. Specimens were prepared and traps set in afternoon.

July 25 (Wed.) Cedar Ranch Wash (Locket Tank) Remained trapping at Locket Tank.

July 26 (Thurs). Tanner Tank Left Locket Tank at 2.30 P.M. and moved about five miles to a point a short distance below Tanner Tank where at 5200 the lava bed gives way along a wash to the red sandstone. Long tongues of lava extend, however, several miles farther in the direction of the river.

~~Locket~~ ^{Tanner} Tank was dry, but we were able to obtain plenty of water from pot holes in the sandstone rock.

Our camp at this point was located beside a pair of bottle-topped rocks that afforded a fairly good shelter from rains from any direction. A heavy rain came just after our arrival, but after it passed Roy & I were able to get out a set of

traps. A number of nighthawks were seen flying about dusk.

July 27 (Fri.). Tanner Tank. Specimens of Neotoma diversorum taken last night proved to be remarkably dark in color and the local form of Perognathus flavus is exceedingly dark although it comes from a reddish sandstone soil. All traps were set for various kinds of mammals. Another heavy rain in afternoon.

July 28 (Sat.) Tanner Tank Heavy rains today. Most of day was spent in preparing a large number of specimens taken last night.

July 29 (Sun.) Cedar Ranch Wash (3 mi above mouth) Left Tanner Tank and travelled ~~about~~ about 12 or 15 miles by a diversion route to avoid a bad crossing of Cedar Ranch Wash which was in flood. Travel was slow, also, on account of boggy places on a flat along the wash. We camped on the wash where it is bordered by sheltering

walls of grayish or reddish brown sandstone about three miles above its mouth and the same distance from the bridge across the Little Colorado on the road to Tuba City. A set of traps was put out.

July 30 (Mon.) Cedar Ranch Wash (3 mi. above mouth). Specimens were prepared and in the afternoon we made a trip to the Little Colorado where observations were made and the locality being unfavorable for collecting we returned and camped at the same place. The bridge spans the river about 2 miles below a point near Tanner's crossing where it enters a box canyon. The canyon at the bridge is perhaps 30 feet in depth.

July 31 (Tue.) Cedar Ranch Wash (3 mi. above mouth).

Rode today about 12 miles down along the canyon of the Little Colorado below the bridge to note the extent and limits of Lower Sonoran elements in that vicinity. The river drops rapidly into a

box canyon rather flood in places for several miles, with stretches of land on which crops are raised just below extreme high water mark along the sides; but it soon deepens to a ~~rock~~ gorge in which no soil is left anywhere above frequent high water limits.

Lower Sonoran and Upper Sonoran zone elements are mixed along the canyon, but the former in dilute form reaches to about 4300 feet, at least on south slopes, to a point near the bridge. Its presence is indicated by the belt of mesquite along the north side of the river just above high water mark, and a number of associated species such as *Lippia wrightii* and by the disappearance of *Fallogia*, the ~~thorny~~ *Atriplex* and other upper Sonoran elements.

Aug. 1 (Wed.) Moencopie Wash. (2 mi. above mouth)

Moved across the river northward and up about 12 miles to a camp on Moencopie Wash to determine distribution of a number of species in

that direction.

Road crossed the bridge and then crossed a gravelly plain for several miles to a point where it began to skirt and finally passed through a series of low hills of peculiar formation, many of them conical or resembling haystacks, a formation that evidently covered an ancient forest. Many petrified trees were seen in very fragmentary condition.

We camped on the broad open wash a short distance above where it enters a box canyon extending to the river.

Aug. 2 (Thurs) Cedar Ranch Wash (3 miles above mouth). Returned today to same camp on Cedar Ranch Wash where an abundance of good water left by recent flood is still percolating through sand. This place is among the sandstone bluffs a short distance above Tappan Spring. Left Moencopie Wash 7 A.M. reached camp about 1.30 P.M., having stopped at store at new place at Bridge - a proposed post office called Cameron.

Aug. 3 (Fri.) Brookbanks Cabin.

Made up specimens taken near Tappan Spring where traps were set yesterday along lava ledges, and left camp at 6 P.M. on return journey to Flagstaff. We followed the main road along the telephone line and arrived at 9.15 at Brookbanks Cabin - an old stone house on the limestone mesa about 10 miles from Tappan Spring. A pool of water left by rain in the rock formation near the house furnished water for our horses. Water is said to occur in the tanks in the small canyon near, but we did not investigate it.

Heavy showers of rain were falling all around and the night, with a high wind blowing was stormy, so we were glad to be assured of shelter. However, we slept outside the cabin where we could easily reach shelter in case of rain. The wind blew hard all night, but no rain fell.

Aug. 4 (Sat.) Aztec Tank.

Started from Brookbanks Cabin 6.45 A.M. the altitude here about 5800 ft. and made camp at Aztec Tank (alt. 5800 ft.) 3 P.M.

distance travelled about 16 miles.

Road led across the limestone to Rimmy Jim's cattle camp where red sandstone crops out. After traversing a red sandstone area we entered the lava beds which overlie the sandstone at a slightly higher elevation. The lava covered mesa was nearly continuous the remainder of the day, but about noon we stopped for lunch at a place where limestone again appears, perhaps 5 miles south of Aztec Tank. The limestone lies along one side of a broad open wash and lava on the other. A short distance farther south the limestone, like the ^{sandstone} ~~lava~~, becomes covered with lava.

Aztec Tank is located near the edge of the cedar belt. A break in the lava, partially filled with cinders, holds the water.

Aug. 5 (Sun.) Aztec Tank.

Remained here today. Hoy spent most of day working on specimens and hunting for small spermophiles while I worked on reports.

Aug. 6 (Mon.) Left Aztec Tank and travelled about 30 miles to

Flagstaff where we arrived about 4 P.M.

Aug. 7 (Tue.) Flagstaff, Ariz.

I remained at Flagstaff preparing specimens brought in and packing specimens for shipment and working on accounts while Randolph and Hoy were sent to Winona to await me tomorrow.

Aug. 8 (Wed.) Walnut Tank. Left Flagstaff at 7.10 A.M. and arrived Winona about 7.45 where rejoined outfit and left 8.15 for Walnut Tank where we arrived about 4 P.M. the total distance from Winona to the Tank about 16 miles.

Road led in a northeasterly direction past Turkey Tank descending through cedar belt to an altitude of 5600 ft. Walnut Tank is ^{in walnut liquor} located in some hard lava or porphyry formation with limestone in the vicinity ~~at~~ above. Traps were set and poison for small mammals were placed.

Aug. 9 (Thurs.)

Remained at Walnut Tank to

get additional specimens of small mammals.

Aug. 10 (Fri.) Winona
Left Walnut Park at 11 A.M. and returned to Winona where we arrived about 7 P.M.

Aug. 11 (Sat.) Winona.
Remained at Winona, preparing reports.

Aug. 12 (Sun.) Gallup, N.M.
Left Winona at 7:48 A.M. and arrived at Gallup by rail at 1:35 P.M.

Aug. 13 (Mon.) Gallup, N.M.
Arranged to leave Gallup Tue. morning for Chin Lee by auto stage. Prepared reports.

Aug. 14 (Tue.) St. Michaels, Az.
Left Gallup at 8 A.M. arrived at St. Michaels about 11 A.M. ^{26 1/2 mi.} and continued to Fort Defiance, 6 mi. N. to see the superintendent of the Navajo Ind. Res., Mr. Peter Paquette. Returned almost immediately to St. Michaels and in afternoon set out traps.

Road ascended gradually from Gallup, soon entering juniper and piñon

wooded mesa country which extended to St. Michaels. Altitude at St. Michaels is about 7000 ft.

St. Michaels is a Catholic Mission, ^{there are two} post office and stores, located near the wash which comes down from Fort Defiance. The wash is bordered by rim rocks or ledges of chocolate colored sandstone. Along and over the low neighboring mesas a few yellow ^{pinus} are beginning to appear, mixed with ^{the more abundant} junipers and piñons.

Aug. 15 (Wed.) ~~San~~ Ganado, Ariz.

Left St. Michaels at 12:40 P.M. by auto stage and travelled west 30 miles to Ganado, arriving about 3:30, alt. 6500 ft.

Road from St. Michaels began ascending gradually at once and crossed the nearly level, pine-covered top of the Defiance Plateau at about 7700 ft., descending thence very gradually into the piñon belt, and finally to Ganado, ^{in a} ~~as a~~ ^{narrow valley} ~~road wash~~, bordered by rim rock ledges about 100 ft. high.

Aug. 16 (Thurs.), Chin Lee, Ariz.
Left ~~Gavale~~ ^{about north} 8 AM by wagon and
travelled ⁴³ miles to Chin Lee (5600 ft.)
arriving at 5.15 P.M.

Road ascended gradually to the
top of a plateau at about 7000 ft.
alt. just south of ~~the~~ Nazlini
creek where it descended by a steep
road to the creek at a store
at a point also called Nazlini
where a stop was made for
dinner and to change teams. We
arrived at Nazlini about noon.
In the afternoon the road from
Nazlini was found to descend
gradually along the broad bottom of
Chin Lee valley to Chin Lee. The
road to near Nazlini is through
juniper & piñon country of the
ordinary type, but just before
beginning the descent from the
top of the mesa to Nazlini a few
trees I took to be *Prosopis juliflora* were
seen along the ^{road} of the high
escarpment of the plateau - a few
 Gambel oaks appeared at the
same time. The route from Nazlini

to Chin Lee is along the broad
open bottom of the valley which
is bordered by mesa escarpments
rising in terraces of varying height.
The country is open and treeless, much
of it very barren and gypsiferous,
petrified wood appearing in many
places and the formation of the
sterile kind associated elsewhere
with the petrified forest.

Chin Lee is a trading station, several
stores are located here, and a Catholic
Mission and Govt school. The place
is located on the broad wash at
the mouth of the Canyon de
Chelly.

Aug. 17 (Fri.). Chin Lee, Ariz.
Remained at Chin Lee, working in
the vicinity and arranging for trip
into mountains to northwest.

Aug. 18 (Sat.) Canyon del Muerto, Ariz.
Left Chin Lee in afternoon and travelled
about 10 miles up Canyon del Muerto with
pack outfit and camped at 5800 ft.

Route was up bottom of canyon
which is a broad ^{only} wash extending in
many places from wall to wall.

up to this point the canyon walls
cut in cross-bedded ^{low at first} sandstone,
increasing in height to about 250 ft.

Aug. 19 (Sun.)

Left camp at 5800 ft. in lower part of
Canyon del Muerto at 8 A.M. and stopped
for lunch at 12.40 P.M. in a grove of
Fremont cottonwoods at 6350. The canyon
walls remain sheer but increased in
height to about 300 ft. near the 6000 ft.
level which was reached about 10 A.M.
Above this point the angle becomes ~~more~~
increasingly steeper and talus slopes
appear. At about 6250 ^{ft.} numerous upper
Sonoran shrubs and trees begin to appear
on talus slopes near the bottom of the
canyon and a fine growth of Populus
fremontii appears. At 6500 ft. the Fremont
cottonwoods drop out and the Douglas spruce
and Gambel oak which began at about
6250 ft. become abundant. The canyon
becomes much narrower and rougher,
and the walls increase to perhaps
600 ft. in places. A noon stop was
made at 6350 in a fine grove of
Populus fremontii. In the afternoon we
haversed the rough upper part of

the canyon to an altitude in the
bottom of 6800 ft., having some difficulty
in working our way along, the
permanent stream flowing here being
filled with boulders in places and
no place available to pass along the
sides. We camped at 6 P.M. in a
grove of Gambel oak above which towered
a single Engelmann spruce.

Aug. 20 (Mon.) Tunitcha Mts., Ariz.

Left camp at upper end of Canyon del
Muerto (6800 ft.) and ^{Tunitcha} camped for night
at about 7500 ft. ~~in the~~ ^{at head of}
along Spruce Creek. A noon stop was made
near the mouth of the canyon or valley
of Spruce Creek.

Route up along the upper part of Canyon
del Muerto was continued with difficulty, the
walls being perpendicular, talus slopes very
steep and ^{shaded} wooded so that only available
way was along creek bed which was full
of deep holes and ^{large} boulders in many places.
Horns, unused to packing, were very
clumsy. Left camp about 8 and the cliffs
became lower as we ascended and we
finally emerged on a mesa about 11 A.M.
The mesa forms an extensive bench

at the base of the higher mountains which rose steeply several miles to north of us. Over the bench the stream we had been following traverses a fairly level area into which it flows from a broad, sloping canyon or narrow valley reaching far back into the higher mts. This part of the stream flowing ^{through} from the higher mts. is marked "Spruce Brook" on Bryan's map. The place chosen for camp was on a small stream entering Spruce Brook from the east, where a northerly slope brings Engelmann spruce and other Canadian Zone elements down to a low elevation. The mts. are steep, but not precipitous, except in a few places near their summits where sandstone ledges and cliffs appear.

Aug. 21 (Tue.) ^{Tunitcha Mts.} Spruce Brook.

Remain at same camp, gathering numerous specimens.

Aug. 22 (Wed.) Tunitcha Mts., near head of Spruce Cr.

Left camp at 7800 ft. on lower part of Spruce Cr. ^{at 8.15 a.m.} and travelled by a fairly good trail up along the creek to a meadow near its head where we camped at about 9000 ft.

Route followed the creek up the narrow sloping, V-shaped canyon or very narrow valley, the trail winding in and out through the trees, crossing and recrossing the stream a number of times. Canadian Zone elements become more generally distributed as we advance, but Transition Zone extends high up on warmer slopes.

Aug. 23 (Thurs.) Tunitcha Mts., near head of Spruce Cr.

From camp at same place I ascended to the top of Roof Butte near the extreme headwaters of Spruce Cr. and about two miles above our camp. This Butte appears to be the highest point of the Tunitcha Mts. From the top, which is of lava or porphyry, capping the sandstone formation and dipping eastward, splendid views are obtainable in all directions. The air was very hazy,

but toward the north I could see the Carrizo Mts. which appear to be very similar in character to the Tunitcha Mts., but much less extensive. A ^{fairly} heavy forest of spruce forest covers the ^{at upper part of the} northeastern slope, below which

evidently
a zone of yellow pine is succeeded by
pinon and juniper and farther down
the slope the open country, fairly
level appearing country extends to the
horizon with the sharp rock known as
"Shiprock" a prominent landmark apparently
not many miles away. Toward the
west across the broad, arid, treeless
appearing Chino Lee Valley I could
dimly see the outlines of Black
Mesa. Toward the south I had a
splendid view down Spruce Cr. valley,
but the light was unfavorable for
photographic work.

Zonal character - Transition zone reaches
far up over ^{warm upland} level surfaces - at least
to 9000 ft., and to about Roof Butte, but
above about 9000 ft. Canadian zone
elements become dominant on all steep
slopes, even those facing southward.
A few yellow pines, ^{and other transition zone elements} however, grow on
the extreme summit at about 9500 ft.
The ^{tree} vegetation on the summit is
mainly aspen ^{and} Douglas spruce, Picea
of Juniperus communis, dwarf manzanita
appear in places. Under the cliffs on
the south side Ribes cereum

and Holodiscus dumosa grow abundantly.
At and ~~below~~ 9000 ft. slope exposure
sharply determines the zone. North slopes
being Canadian and south slopes
Transition in character.

Aug. 24 (Fri.) Tumbicha Mts, 7800 ft.
on lower part of Spruce Cr.

Remained working in vicinity of same
camp until 5 P.M. when we started on
return trip and descended along Spruce
Creek by the same trail used in
going in and camped at the same
spot we had camped at 7800 ft. in
the lower part of the valley at the
Aug. 20.

A shower in the afternoon forced us
to put up our tent. This is the
first rain we have had.

Aug. 25 (Sat.). Chino Lee, Ariz.
Left camp on Spruce Cr. at 9 A.M.,
having finished work on hand preparing
specimens and returned to Chino Lee where
we arrived about 7.30 P.M. Total distance
travelled between 30 and 35 miles.

Road descended along Spruce Creek for
several miles, passing out of the mountains
on the mesa where instead of entering the

head of the Canyon del Muerto which we had traversed on the upward journey we took the wagon road and made a short cut down the sloping mesa. The road extends through juniper and piñon timber nearly all the way down to the valley at Chin Lee, the piñon being the dominant species over most of this slope.

Big yellow pine extends out from the higher mts. for a space over the ^{elevated} mesa near the heads of Canyon del Muerto and Canyon de Chelly, but the piñon belt extends close to the steep ~~slope~~ base of the mountains north of the head of the former canyon, and a depression or basin carries valley conditions well in toward the ^{west} base of the Tuckachewi Mts.

Aug. 26 (Sun.) Chin Lee, Ariz.

Remained at Chin Lee, working in the vicinity and preparing to leave for Gallup tomorrow.

Aug. 27 (Mon.), Gallup, N.M.

Left Chin Lee at 8 A.M. and arrived at Gallup about 8 P.M., having had considerable difficulty with our machine,

a nearly wrecked Ford car. We got stuck in sand in a number of places and required help in getting up the steep hill south of Nazline, Dist. tra about 95 mi.

Aug. 28 (Tue.) Flagstaff, Ariz.

Reorganized outfit at Gallup and left Gallup at 3.50 P.M. train late and arrived at Flagstaff about 9 P.M.

Aug. 29 (Wed.) Mt. Sitgreaves, Ariz.

Attended to various business matters at Flagstaff in morning and in afternoon ~~about~~ ^{about} 35 miles by auto driven by D. A. Selchert, leaving Flagstaff about 1 P.M. and arriving at Ranger station at base of Mt. Sitgreaves about 5.30 P.M.

Road led near the railroad to near Maine where we turned northward through Spring Valley to the station near the north base. General route is over ^{pine} forested plateau with large open ~~part~~ ^{part} east of Sitgreaves. Spent the night at Ranger station ^(Chino)

Aug. 30. Grand Canyon, Ariz.

Climbed from ranger station at north base to near summit of Mt. Sitgreaves

making important observations and returning to a ranch near ranger station about noon with specimens of Sciurus mogelloniensis secured. Leaving the vicinity of Mt. Sitgreaves about noon we travelled over very rough cross country roads northward past Red Mountain and Slide Mt. Both of which I had a good chance to examine. Continuing northward we passed from the Coconinos across the gap into the northern division of the Tusayan Forest where I observed and secured a specimen of Sciurus aberti. In the evening we ran into Grand Canyon for gas and to spend the night.

Aug. 31 (Fri.). Flagstaff, Ariz.

Returned today by a different route, the main road east of San Francisco Mt. to Flagstaff.

Sept. 1 (Sat.). Flagstaff, Ariz.

Remained at Flagstaff, making up accounts and preparing reports.

Sept. 2-3 (Sun & Mon.)

Remained at Flagstaff, preparing reports.

Sept. 4 (Tue.). Peach Springs, Ariz.

Left Flagstaff 9.45 A.M. and arrived at Peach Springs, Ariz. about 3.30 P.M. train late.

Route west from Flagstaff is through pine forest to a point a short distance east of Fairview where the railroad descends rapidly and enters the rolling mesa country which with low eminences and slightly mesas rising slightly above the general level extends west to the broad level floor of Aubrey Valley west of Seligman where a gradual ascent leads up to the top of the Yampai divide; then comes a gradual descent to Peach Springs, ^{at 4800}.

Peach Springs is located near the head of Tranter Canyon. Low hills about the railroad station are thickly clothed with piñon (P. monophylla) and Juniperus monosperma with patches of the scrub oak appearing along arroyos.

Sept. 5 (Wed.) Peach Springs, Ariz.

Remained working at Peach Springs and arranging for trip to Colorado

River tomorrow.

Sept. 6 (Thurs.) Colorado River,
^{Camp Powell} (mouth of Diamond Creek) Left Peach Springs (railroad station) and travelled by wagon 21 miles northerly down Diamond Creek to the Colorado River at 1000 ft. altitude.

From Peach Springs station the road ascends slightly crossing a ridge at about 4900 ft. within a mile and begins the long gradual descent to the river at 1000 ft. Beyond the ridge it enters a broad gulch and about 5 miles out passes Peach Springs whence water has been pumped for many years for the use of the railroad at the station bearing the same name. A few peach trees still growing there are said to have given the name to the Springs. From the springs a gradual descent by a rough but fairly good road leads down Peach Springs Wash and enters the bottom of Diamond Creek about a mile from the Colorado River. The cliffs become precipitous along

the route near Peach Springs and increase in height to a point along the lower part of Peach Springs ^{which}

Camp Powell, established by the Hualapai Syndicate to develop ^{across the Colorado} water power by building a dam at the mouth of Diamond Creek, afforded convenient quarters. Mr. E. H. Carpenter, in charge, was most obliging. ^{the D. C.}

The mouth of Diamond Creek is ~~about~~ canyon is perhaps 200 yards wide and neighboring talus slopes bear a rather scanty fauna. The first terrace is in sandstone about 600 feet above the river and is also sterile.

Fig. - Terrace 600 ft. above river at mouth Diamond Creek. Thinly overgrown with *Guzg acacia*, *Opuntia whipplei*, *Echinocactus* (tall sp.), and a very few mesquites.

Sept. 7 (Fri.) Remained working at mouth of Diamond Creek.

Sept 8 (Sat.).

Working at mouth of Diamond Creek and at Peach Springs (not Pump station).

Sept. 9 (Sun.). Returned to
Peach Springs from Colorado trip,
arriving about noon.

Sept. 10 (Mon.) Hackberry

Finished work at Peach Springs and
took train in afternoon ^{2:15} to Hackberry where
we arrived in the midst of a heavy
shower, about 3 P.M. Rain continued rest of evening.

Sept. 11 (Tue.) to Sept. 16 (Sun.)

Remained working steadily in the
vicinity of Hackberry. On the latter date
preparations were made for starting on a
trip north to the Colorado River near
Gregg's Ferry.

Sept. 17 (Mon.) Gold Basin, Ariz.

Left Hackberry at 8 A.M. by auto and
travelled northwesterly to near Gregg's Ferry
at the mouth of Hualpai Wash and returned
as far as Gold Basin where a large number
of traps were set and we joined a
cattle roundup for the night at the
site of the old mill.

Our route from Hackberry was northwesterly
along the bottom of Hualpai Valley and
down Hualpai Wash to a point a few
miles south of the river where the
country began to appear very barren

and I decided to turn back at about
2000 ft. altitude in order to insure having
time for trapping operations near Gold
Basin. The Hualpai Valley has a broad,
nearly level floor extending from the
base of the ^{on the east} Grand Wash Cliffs or Music
Mts. across to the Cerbat Mountains on
the west. The distance across at the
widest part 12 or 15 miles north of
Hackberry is 12 or 15 miles. The valley
floor maintains an elevation of about
3000 ft. to a point near Gold Basin
where the valley narrows and ~~the~~ ^{the}
a wash ^{known as Hualpai Wash on maps} narrowing gradually begins to
descend rather rapidly toward the
Colorado River at Gregg's Ferry. From
the ^{broad} valley floor there appears to be
little drainage. Shallow water stands
for a time over large, level areas,
but is said to soon sink or
disappear through evaporation. The
Music Mts. with a northwesterly trend
border the valley ^{east and} on the Cerbat
Range on the west.

Sept. 18 (Tue.) Hackberry, Ariz.

Returned to Hackberry today, taking
up traps at Gold Basin and

carrying specimens in with us,
arriving about 5 P.M.

Sept. 19. Hackberry, Ariz.
Remained at Hackberry today, preparing
specimens and ^(thens) setting litters, etc.

Sept. 20. Big Sandy River (near Owens)
Left Hackberry about 8 A.M. by auto
for Big Sandy River, near Owens where
we arrived during afternoon and
set out a large number of traps.

Road ~~there~~ ascended the small
valley east of Peacock Mts. and
crossed a low divide at about 4000 ft.
and immediately began the descent
along Little Sandy Wash, which lower
down below the mouth of Trout Creek
becomes known as Big Sandy River, a
running stream whose course is nearly
due south to the Bill Williams River.

The pass carries mixed Upper and
Lower Sonoran elements but below
3800 ft. on the southern side the
Upper Sonoran elements disappear.
We camped for the night at a warm
spring near Owens, a place formerly
a post office.

(Fri)
Sept. 21. Hackberry, Ariz.
Took up traps and worked along Big
Sandy River until near noon. In
afternoon prepared specimens until
about 5 P.M. when we started on return
trip to Hackberry, arriving about
10 P.M.

Sept. 22 (Sat.). Hackberry, Ariz.
Made up specimens brought from
Big Sandy and resumed work at
Hackberry - a number of steel traps
were set.

Sept. 23 (Sun) Hackberry, Ariz.
Remained working at Hackberry.

Sept. 24 (Mon.). Kingman, Ariz.
Packed up at Hackberry and left
at 3.30 (train late) and arrived at
Kingman at 4.30 P.M.

Sept. 25 (Tue.). Remained at
Kingman preparing reports.

Sept. 26 (Wed.). Finished
reports and moved by rail in
afternoon to Topock on Colorado
River. Left Kingman at 3.50 P.M.
and arrived at Topock at 5.15 P.M.

Sept. 27-30. (Sun.) Remained
working at Topock, Ariz.

Oct. 1 (Mon.). Kingman, Ariz.
Left Topock 9.30 A.M.; arrived Kingman
11.50 A.M. Afternoon preparing expense account.

Oct. 2 (Tue.). Kingman, Ariz.
Remained at Kingman preparing reports.

Oct. 3 (Wed.). Huapai Mts., Ariz.
Left Kingman about 2 P.M., after some
delay in waiting for car, and travelled
by auto about 17 miles to a point
at 5800 ft. on the northern slope of
the Huapai Mountains.

Road from Kingman followed the
main road to Hackberry, ascending
gradually over the northern base of
the Huapai Range to a point about
10 miles from town where it turned
off and climbed steeply up ~~over~~ over
a ridge and then down and up a
canyon to a point where a sawmill
formerly stood near the lower edge
of the yellow pines.

Weather clear and fine.

Oct. 4 (Thurs.) Huapai Mts.
From camp Hoy and I climbed up
and ~~set~~ around the peaks to near
the highest point of the range
where we set our traps.

decomposing

The ^{detached} Huapai Mts. are of granite and
great boulders are scattered all along
the upper slopes.

Oct. 5 (Fri.). Huapai Mts.
Continuing work on the upper slope
of the mountains today we climbed to
the top of the highest peak which
according to aneroid has an altitude
of 8100 ft. The air was hazy but
excellent views were obtained in all
directions. The highest mountains were
toward the south where Transition
zone extends on north slopes along
the ridges to a mountain assumed to
be Granite Peak. Fairly high mountains
continue further, but are lower and
apparently do not reach out of
Upper Sonoran zone. The Huapai Range
as viewed from the peak is very
deeply scored by canyons and washes
which have cut in many places across
the ancient backbone of the range.

I found a few runways of *Microtus*
in grassy places of very limited extent,
the best ~~within~~ a few feet of the
extreme summit, but arrangements had
been made to return to Kingman and I

cannot very well take them.

Oct. 6 (Sat.) Kingman, Ariz.
Finished work at base camp at 5800 ft. in Huolpai Mts. and returned in evening to Kingman, Ariz.

Oct. 7 (Sun.) + Oct. 8 (Mon.).

Remained at Kingman preparing reports.

Oct. 9 (Tue.). Kingman, Ariz.

Left Kingman at 9 A.M. for Chloride where I arrived by rail at 11.20 A.M.; left Chloride at 1 P.M. and arrived at Kingman again at 3 P.M. The object of the trip was to examine the country along the route.

From Kingman the railroad descends rapidly along the canyon to McConnico at about 3000 ft. where leaving the main line the branch to Chloride turns northward. It continues descending into Sacramento ~~Valley~~ Valley for a short distance but at an altitude of about 2750 ft. begins a steady ascent to Chloride at 4000 ft. at the western base of the Cerbat Mountains 28 miles northward from Kingman. Excellent views from the railroad which skirts the western base of the Cerbat Mountains show

that the range is Upper Sonoran in character for considerable distance along the top east of Chloride. Cerbat Peak, the highest point reaches an altitude of about 5500 ft. and the general altitude of the crest in its vicinity is about 5000 ft. The Sacramento Valley, west of the Cerbat Mts. is a broad floored one, sloping gradually toward the western side, the wash skirting the Black Mountains which do not appear to reach Upper Sonoran zone. Upper Sonoran zone elements are beginning to appear at 4000 ft. at Chloride, but the western side of the ^{Cerbat} mountains are Lower Sonoran to about 4500 ft. altitude.

Oct. 10 (Wed.) Wickburg, Ariz.

Left Kingman about 8 A.M. (train late) and arrived at Ash Fork about noon, leaving there at 1.50 P.M. arrived at Wickburg about 8.15 P.M.

Oct. 11 (Thurs.). Wenden, Ariz.

Remained at Wickburg working on reports until evening when the daily train west was taken at 8 P.M.

and arrived at Wenden about 9.25 P.M.

Oct. 12 (Fri.). Harguabala Mts., Ariz.

Left Wenden by auto at 9 A.M. and after some difficulty reached a camp at 2750 ft. on the eastern basal slope of the Harguabala Mts. about noon. Work was carried on near camp in the afternoon.

Oct. 13 (Sat.) Harguabala Mts., Ariz.

The day was spent in making a long, hard climb to the crest of the Harguabala Mts. where traps were set for small mammals. The altitude according to aneroid is 5750 on the highest point formerly used by the Coast Survey as a triangulation station.

A good trail leads to the crest along Squaw Canyon, but we were obliged to traverse a rough foothill section in order to reach the trail.

Oct. 14 (Sun.). Wenden, Ariz.

A trip was made from base camp to near summit of Harguabalas to take up traps

set yesterday, and by prearrangement an auto from Wenden came out to our camp and we returned to town, arriving about 5.30 P.M.

Oct. 15 (Mon.). Wenden, Ariz.

Remained at Wenden, preparing specimens taken in Harguabalas and setting traps near Wenden.

Oct. 16 (Tue.). En route to Calif.

Concluded work at Wenden at 9.25 P.M. I took the train for Calif.

Oct. 17 - 25

On annual leave in Calif.

Oct. 26, Wickenburg, Ariz.

Arrived at Wenden from Calif. at 6 A.M. and resumed official work at 9 A.M. Packed specimens and arranged outfit for shipment and left Wenden at 6 P.M. Local train late; arrived at Wickenburg at 10 P.M., too late to catch train for Phoenix, and accordingly spent night there.

Oct. 27, En route to Washington. Left Wickenburg at 7.30 A.M. and

reached Phoenix at 9 a.m.; left
Phoenix 7.30 P.M. for Maricopa where
I arrived between 8 and 9 P.M. and
took train eastbound about 10.30 P.M.

Oct. 28-31 - En route to
Washington, D.C., arriving about 6
P.M. on the latter date.